

Ultrospec™ 2100 *pro*

Ultrospec 2100 *pro* UV/Visible spectrophotometer (Fig 1) has an integral graphical display and easy to-use software making it suitable for use in the laboratory. Xenon lamp technology minimizes annual running costs.

In addition to the basic modes of absorbance, transmission and concentration, there are routines for wavelength scanning, simple kinetics, reaction rate, standard curve and equation entry for multi-wavelength applications. There are also stored routines for nucleic acid quantitation and purity assessment; the large informative display shows all relevant results at the same time, and a nucleic acid scan routine enables visual inspection of sample integrity.

Eighteen methods can be saved in three groups of six, making the instrument very practical in a multi-user laboratory. With a range of output modes—direct to Microsoft® Excel®, control by Datrys software, output to a printer, and self test program for GLP purposes, the Ultrospec 2100 *pro* is a versatile and reliable instrument for use in any laboratory.



Fig 1. Ultrospec 2100 *pro*.

Features	Benefits
Xenon lamp	Press-to-read system means low cost of ownership during product lifetime; a 3 year lamp warranty is offered
GLP self test program	Prove performance of instrument at any time and at no extra cost
Integral display with graphics	Intuitive and easy to use
Built-in applications software that is complete	No additional expense for software modules No possibility of losing software cards
Stored methods for nucleic acid quantification	Nucleic acid analysis is easier
< 3 nm bandwidth	Optimum resolution for scanning biomolecules
18 user-stored methods in three customizable groups	Simplifies filing and is suitable for multiple users
Integral sipper accessory option	Suitable for high throughput
Automated 8 cell changer included	Increased throughput without additional accessories

Display and keypad

The 240 × 160 pixel, graphical, liquid crystal display (Fig 2) provides the user with set up parameters and experimental results in either English, German, French, Spanish or Italian. To optimize viewing of the display, the back light can be turned off and the contrast adjusted. To use the instrument, press the soft key on the keypad directly below the corresponding option on the display (F1, F2 and F3) to select that option. Pressing the red stop key acts as an escape mechanism in most situations.

For text entry; the keypad has an alphanumeric function at the appropriate menu options.



Fig 2. Ultraspec 2100 pro display and keypad.

Basic modes

The measurement of sample absorbance, transmittance and concentration (Fig 3) using a factor is fundamental in UV/Visible spectrophotometry. The Ultrospec 2100 pro is capable of more complex multiwavelength measurements that are frequently used in quality control situations.

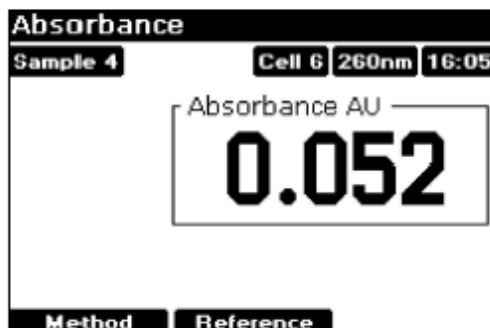


Fig 3. Absorbance mode.

Wavelength scanning

The measurement of an absorption spectrum, together with identification of peak height and position, for a sample can be performed. With a survey scan speed of 3000 nm/min- and a wavelength range of 190 to 900 nm, the Ultrospec 2100 pro is suitable for routine scanning applications. Spectra can be viewed and printed out (Fig 4).

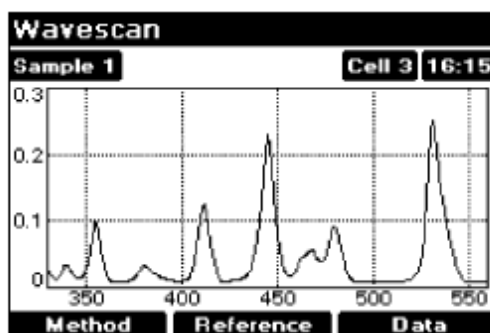


Fig 4. Typical wavelength scan.

Simple kinetics

The measurement of the change of absorbance over time, particularly at 340 nm for NAD/NADH assays, is an important application in UV/Visible Spectrophotometry. Results are displayed graphically (Fig 5) in either seconds or minutes on the Ultrospec 2100 pro.

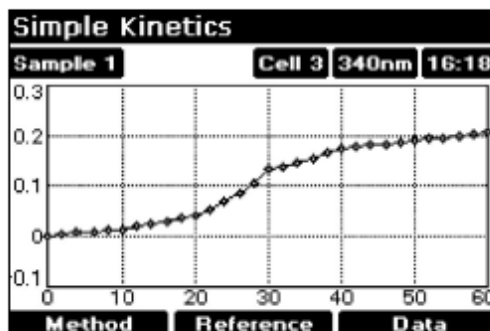


Fig 5. Typical simple kinetics assay.

Reaction rate

The use of reagent test kits for the enzymatic determination of compounds in clinical and industrial laboratories is ubiquitous. These experiments are readily performed on the Ultrospec 2100 pro (Fig 6) with absorbance change over the specified time period (multiplied by an appropriate factor) being displayed at the end with the slope and line quality of the assay.

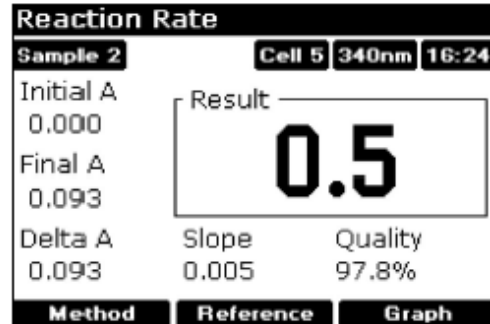


Fig 6. Typical reaction rate result.

Standard curve

The construction of a multipoint calibration curve from standards of known concentration to quantify unknown samples is a fundamental use of a UV/Visible spectrophotometer. A common assay is the BCA determination for proteins. Using the Ultrospec 2100 pro, nine standards replicates can be used to build the standard curve. This can of course be saved and retrieved as a method. Slope and intercept are calculated automatically (Fig 7).

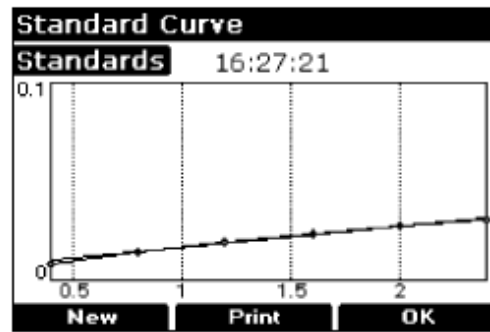


Fig 7. Typical standard curve experiment.

Multiple wavelength/equation entry

Many quality control and development processes require the use of absorbance values in equations to determine a meaningful parameter. The Ultrospec 2100 pro can measure five absorbances at specified wavelengths and then use these values in a user defined equation so that post measurement calculations are done automatically (Fig 8). Thus the instrument can be customized to suit your individual need

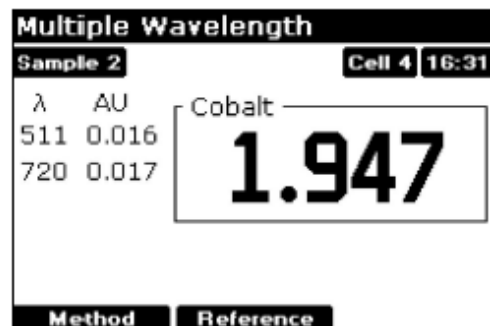


Fig 8. Equation entry result.

Nucleic acids

Ultrospec 2100 *pro* has stored routines for measuring DNA, RNA and oligonucleotide samples. Absorbance measurements (230, 260, 280 and 320 nm), absorbance ratios (A_{260}/A_{280} and A_{260}/A_{230}) and concentration are shown on the easy-to-read display together (Fig 9). Sample dilution and cell pathlength are compensated for automatically. In addition, a wavelength scan can be obtained for a visual inspection of sample integrity which is particularly useful for RNA samples.

Volumes as low as 3 μl and 7 μl can be accommodated using the capillary and the ultra microvolume cell with the appropriate cell holder, respectively.

Good laboratory practice

Being able to check that an instrument is working to its published specification is an essential prerequisite for GLP. The Ultrospec 2100 *pro* performs GLP self-diagnostic tests (Fig 10) for bandwidth, absorbance accuracy, wavelength accuracy and stray light and compares them with the values obtained during instrument manufacture (or last accredited engineer service). The GLP calibration interval can be set by the user to be always, daily, weekly, monthly or quarterly.

Output to printer

The Ultrospec 2100 *pro* is compatible with the Seiko DPU-414 printer for print out of both text and graphics. When combined with the printer stand (Fig 11), a compact system is obtained.



Fig 11. Ultrospec 2100 *pro* with printer and printer stand.

DNA		
Sample 2		Cell 4 16:32
λ	AU	Concentration ng/ μl
230	0.311	177
260	0.177	
280	0.083	
		260/230 0.57
		260/280 2.12
Method		Reference
		Graph

Fig 9. Typical DNA result.

Ultrospec 2100 *pro* GLP report

Instrument	Ultrospec 2100 <i>pro</i>	
Operator	A T Dadd	
Date	22 September 2013	
Time	10:00:17	
Serial no.	79500	
Version	4190 V1.0	
Calibrated	21 September 2013	
Instrument life	25.6 Hours	
Lamp energy	100%	
Service	10 September 2013	
Bandwidth (2.0–3.0 nm)	2.9	PASS
Wavelength accuracy 881.9 nm (± 1 nm)	881.9	PASS
Absorbance accuracy 220 nm (1.763–1.781 A)	1.772	PASS
340 nm (1.633–1.665 A)	1.649	PASS
500 nm (1.477–1.491 A)	1.484	PASS
Stray light 220 nm (<0.05%)	0.021	PASS

Fig 10. Ultrospec 2100 *pro* GLP self diagnostics print out.

Control by Datrys software

Although Ultrospec 2100 *pro* is a stand-alone instrument for discrete measurements on the laboratory bench, it can also be controlled from a PC using Datrys software (Fig 12). Datrys comprises a set of sophisticated application software for fixed wavelength measurements (single or multiple wavelengths, including ratios, concentration calculations and limit checking), wavelength scanning, kinetics, quantitative calibration curves, and multiwavelength applications. The software provides the ability to perform extensive post-run manipulations on data acquired using the spectrophotometer. Datrys is compatible with Windows XP®, Windows Vista®, and Windows® 7.

Datrys software is supplied in different modules to meet the application requirements of different user groups and offers a simpler upgrade path should your requirements change.

Choose:

- Datrys Lite for quick read and fast scanning only
- Datrys for all routine measurements
- Datrys Life Science for nucleic acids, proteins and cell density measurements
- Datrys CFR if you need full 21 CFR Part 11 compliance

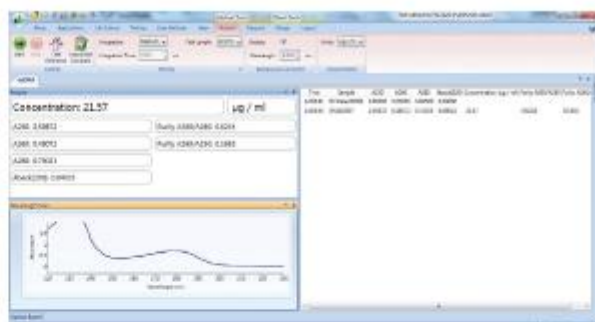


Fig 12. Ultrospec 2100 *pro* can be controlled from a PC using Datrys software.

Modules	Datrys Lite	Datrys	Datrys Life Science	Datrys CFR
Quick Read and Quick Scan	●	●	●	●
Fixed wavelength (single or multiple)		●	●	●
Validation	●	●	●	●
Method Developer		●	●	●
Life Science Methods			●	●
21 CFR Part 11 Compliance				●
Accessory Control		●	●	●

Technical specification¹

Wavelength range	190–900 nm
Monochromator	1200 lines/mm Aberration corrected concave grating
Maximum scanning speed	3000 nm/minute
Spectral bandwidth	< 3 nm
Wavelength accuracy	± 1 nm
Wavelength reproducibility	± 0.5 nm
Light source	Kenon lamp
Detectors	two silicon photodiodes
Photometric range	- 3.000 to 3.000 A, 0.01 to 9999 concentration units, 0.1 to 200% T
Photometric accuracy	± 0.5 % or ± 0.003 A to 3.000 A at 546 nm, whichever is the larger
Photometric reproducibility	within 0.5 % of absorbance value to 3.000 A at 546 nm
Stability	± 0.001 A per hour at 340 nm at 0 A
Stray light	< 0.05 % T at 220 nm using NaI and < 0.05 % T at 340 nm using NaNO ₂
Digital output	9 pin serial and Centronics parallel
Sample compartment size	210 × 140 × 80 mm
Dimensions	510 × 350 × 160 mm
Weight	13 kg
Power requirements	100–240 V AC ± 10 %, 50/60 Hz, 80 VA

¹ Specifications are measured after the instrument has warmed up at constant ambient temperature and are typical of a production unit.

Ordering information

Description	Code no.
Ultrospec 2100 pro Classic	80-2112-21

Accessories

Description	Code no.
Datrys	29-0036-21
Datrys Lite	29-0036-22
Datrys Life Science	29-0036-23
Datrys CFR	29-0036-24
Seiko DPU-414 thermal pinter	80-2108-80
Printer stand	80-2112-13
8-Position Water-Heated Cell Holder	80-2109-70
Ultra Microvolume Cell with Black Walls (5–7 µl working volume)	80-2103-68
Ultra Microvolume Cell Holder	80-2106-06